REMARKS

Applicants acknowledge the Examiner's indication that claims 13-14 define patentable subject matter and would be allowed if rewritten in independent from including all limitations of the base claim and any intervening claims from which they depend.

Reexamination and reconsideration of the present application are requested.

Applicants have amended the Title to more accurately describe the subject matter of the pending claims of this continuation application. Applicants have also added new claims 21-23. Accordingly, claims 9-14 and 21-23 remain pending in the application.

35 U.S.C. § 102 & 103

The Office Action rejects claims 9-10 under 35 U.S.C. § 102 over Lo et al. U.S. Patent 6,232,787 ("Lo"), and claims 11-12 under 35 U.S.C. § 103 over Lo in view of Talbot U.S. Patent 6,091,249 ("Talbot").

Applicants respectfully traverse those rejections for at least the following reasons.

Claim 9

Among other things, the method of claim 9 includes determining whether a surface of the conductive layer is exposed through the contact hole in the insulating layer pattern **based on a change in an amount of collected secondary electrons**.

Applicants respectfully submit that Lo does not disclose a method including this feature.

The Office Action states that such a feature is disclosed by Lo at col. 4, lines 23-38; col. 8, line 54-col. 9, line 6; and col. 10, lines 11-23).

Applicants respectfully disagree. The text at col. 4 does not pertain to, or even mention at all, any contact holes or conductors exposed by any contact holes.

Meanwhile, the text at cols. 8-9, and col. 10, does **not** disclose determining whether a surface of the conductive layer is exposed through the contact hole in the

insulating layer pattern based on a change in an amount of collected secondary electrons. Instead, the disclosed method determines an electrical conductivity of an exposed material based on an apparent **size** (diameter) of a feature in a voltage-contrast image, not an actual amount of collected secondary electrons.

The Office Action also states that "Lo et al teach determining faults (which essentially means the underlying structure is exposed) from voltage contrast imaging," citing col. 7, lines 39-48; col. 39-59).

However, that is not what Applicants have claimed. Instead, Applicants have specifically claimed determining whether a surface of the conductive layer is exposed **through the contact hole** in the insulating layer pattern **based on a change in an amount of collected secondary electrons**. In that regard, Applicants note that Lo specifically teaches that:

> "This contrast-based defect-detection scheme, however, is difficult to apply to inspection of the bottom of high-aspect ratio micro-structures, such as unfilled contact holes . . . all contact holes have similar contrast (very dark) in the voltage-contrast images, regardless of their underlying electrical connections."

Lo at col. 7, lines 49-58.

To address such a problem, in contrast to the method of claim 1 which repeatedly scans the hole and determines a change in the amount of secondary electrons that are collected, Lo negatively charges-up the surface of the wafer before it scans the surface (including the hole).

Thus, Lo teaches something quite different from the method of claim 1, and indeed, does not disclose determining whether a surface of the conductive layer is exposed through the contact hole in the insulating layer pattern based on a change in an amount of collected secondary electrons.

Accordingly, for at least these reasons, Applicants respectfully submit that

claim 9 is clearly patentable over Lo.

Claim 10

Claim 10 depends from claim 9 and is deemed patentable over Lo for at least the reasons set forth above with respect to claim 9.

Claims 11-12

Claims 11-12 depend from claim 9. Talbot does not remedy the shortcomings of Lo as explained above with respect to claim 9. Accordingly, claims 11-12 are also deemed patentable over any possible combination of Lo and Talbot for at least the reasons set forth above with respect to claim 9, and for the following additional reasons.

Claim 12

The Office Action states that both Talbot and Lo "teach comparison of data to a reference."

Respectfully, that is not what is claimed in claim 12, and it ignores the plain language of claim 12. Claim 12 does not just recite "comparing data to a reference." Instead, among other things, the method of claim 12 specifically features: (1) providing a sample graph which shows the change in the amount of collected secondary electrons with respect to a number of scans of primary electrons; and (2) providing a reference graph which shows a change in the amount of secondary electrons detected in a standard state where the conductive layer is exposed with respect to a number of scans of primary electrons.

Neither Lo nor Talbot nor any combination thereof discloses or suggests either of these features.

Indeed, the Office Action makes no mention whatsoever of these features of claim 12. Applicants respectfully request that the Examiner either cite something in the prior art that either discloses or suggests the specifically-claimed features of claim 12, or else allow Applicants' claim 12.

NEW CLAIMS 21-23

By this Amendment, Applicants add new claims 21-23. Applicants respectfully submit that the subject matter of each of these claims is fully supported by the originally-filed specification and drawings, and is patentable over the cited prior art for at least the following reasons.

Claim 21

Among other things, the method of claim 21 features scanning an inside of the contact hole with a beam of primary electrons at least N times, where N is an integer greater than one, and determining whether a surface of a conductive layer is exposed through the contact hole based on a change in then amount of collected secondary electrons as a function of the N scans. Such a feature is described, for example, at page 20, lines 23-26 and page 21, lines 8-22, and illustrated in FIGs. 7-10.

Neither Lo nor Talbot nor any combination thereof discloses or suggests either of these features.

Accordingly, Applicants respectfully submit that claim 21 is patentable over the cited prior art.

Claim 22

Claim 22 depends from claim 21 and is deemed patentable for at least the reasons set forth above with respect to claim 21.

Also, among other things, the method of claim 22 features determining a scan number (X) among the N scans where a peak number of secondary electrons are collected, and comparing X to a reference value.

Such a feature is described, for example, at page 22, lines 15-19, and illustrated in FIGs. 7-9.

Neither Lo nor Talbot nor any combination thereof discloses or suggests either of these features.

Accordingly, Applicants respectfully submit that claim 22 is patentable over the cited prior art.

Claim 23

Claim 23 depends from claim 21 and is deemed patentable for at least the reasons set forth above with respect to claim 21.

Also, among other things, the method of claim 23 features providing a sample graph which shows the change in the amount of collected secondary electrons with respect to a number of scans of primary electrons; providing a reference graph which shows a change in the amount of secondary electrons detected in a standard state where the conductive layer is exposed with respect to a number of scans of primary electrons; and determining whether the conductive layer is exposed by comparing a waveform of the sample graph to a waveform of the reference graph.

Such a feature is described, for example, at page 22, lines 9-19, and illustrated in FIGs. 7-10.

Neither Lo nor Talbot nor any combination thereof discloses or suggests either of these features.

Accordingly, Applicants respectfully submit that claim 23 is patentable over the cited prior art.

CONCLUSION

In view of the foregoing explanations, Applicant respectfully requests that the Examiner reconsider and reexamine the present application, allow claims 9-14 and 21-23, and pass the application to issue. In the event that there are any outstanding matters remaining in the present application, the Examiner is invited to contact the undersigned attorney Kenneth D. Springer (Reg. No. 39,843) at (703) 715-0870 to discuss these matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No.

50-0238 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17, particularly extension of time fees.

Respectfully submitted,

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Date: 14 July 2004

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